

SPECIFICATION AMENDMENTS

On page 1, above line 1, insert--Priority Claim

The present application claims priority of European Patent Application No. 03076824.6 filed 12 June 2003.--

On page 1, above line 1, insert--Field of the Invention--

On page 1, above line 15, insert--Background of the Invention--

On page 2, above line 1, insert--Summary of the Invention--

Paragraph on line 1 of page 2 has been amended as follows:

-- According to the invention there is provided a percussion drill bit for drilling into a subterranean earth formation, the drill bit having a central longitudinal axis and being operable by applying repetitive axial percussive impacts on the drill bit in a direction having a component along the axis and by applying rotary motion about the axis relative to the earth formation, the drill bit comprising

[[-]]one or more axial cutters for predominantly axially cutting the subterranean earth formation in response to the axial percussive impacts;

[[-]]one or more shear cutters for predominantly shear cutting the subterranean earth formation in response to the rotary motion; whereby

[[-]]there is a first shear cutter of the one or more shear cutters, and whereby one or more of the axial cutters are arranged with respect to at least the first shear cutter to engage with the subterranean earth formation earlier during a percussive impact and/or deeper into the earth formation than at least the first shear cutter.--

Paragraph on line 29 of page 2, ending on line 2 of page 3, has been amended as follows:

-- ~~Since in accordance with the invention~~ the axial cutters are arranged to engage with the earth formation during the percussive impacts before at least said first shear cutter, the most intense part of the axial impacts accompanying the percussive motion

is taken by the axial cutting elements. The percussive load on at least said first shear cutter is thereby reduced and consequently its operational lifetime is thereby improved. Thus the axial cutters effectively protect the shear cutter.--

Paragraph on line 19 of page 3 has been amended as follows:

-- As an additional advantage ~~of the invention~~, the axial cutters can be optimised for axial cutting action, whereas the shearing cutters can independently be optimised for shear cutting without having to take into account axial cutting capability.--

On page 8, above line 10, insert--Brief Description of the Drawings--

Paragraph starting on line 10 of page 8 has been amended as follows:

--The invention will now be illustrated by way of example, with reference to the accompanying drawing wherein

FIG. 1a shows a perspective view of an embodiment of a 6" 3-blade percussion drill bit in accordance with the invention;

FIG. 1b shows a top view of the bit face of the percussion drill bit shown in FIG. 1a;

FIG. 2 shows a schematic cross section of the cutter arrangement;

FIG. 3a shows a perspective view of a 6" 4-blade percussion drill bit in another embodiment of the invention;

FIG. 3b shows a top view of the bit face of the percussion drill bit shown in FIG. 3a;

FIG. 4 is a graph showing recessing variation over consecutive tracks on a 6" bit face;

FIG. 5 shows a top view of an 8" bit face according to still another embodiment of the invention, having 8 blades; and

FIG. 6 schematically shows different shear cutters having pre-cut flat impact surfaces.--

On page 8, above line 31, insert--Detailed Description of the Invention--

Paragraph starting on line 33 of page 8, ending on line 13 of page 9, has been amended as follows:

-- A perspective view of a 3-blade percussion drill bit in accordance with an embodiment of the invention is shown in FIG. 1a. The drill bit comprises a shank 1 stretching longitudinally about a central longitudinal axis of the drill bit, which shank can be especially adapted to fit inside a drill string. The rearward end of the shank is connected to a striking surface 2 to receive impacts from a percussive hammer, preferably a reciprocative piston hammer (not shown). The forward end of the shank is connected to a drilling head 3. The shank 1 is provided with a plurality of splines 4, running essentially longitudinally along the shank 1. The splines 4 serve to rotationally couple the drill string and the shank 1, so that the drill bit is operable by applying both axially directed percussive impacts on the drill bit and rotary motion about the central longitudinal axis.--

Paragraph on line 18 of page 10 has been amended as follows:

-- FIG. 2 depicts a schematic representation of the cutter arrangement in accordance with this embodiment of the invention, as seen in a tangential cross section. As in the previous figures, arrow 5 depicts the direction of rotary motion that, in operation, is applied to the drill bit. Visible are one of the blades 6 and its leading edge 91 with respect to the direction of rotary motion, which blade protrudes downwardly from the drill head and accommodates cutters 9 and 10. A shear cutter 9 is provided on or adjacent to the leading edge 91. Behind the shear cutter 9 in relation to the direction of rotary movement 5, is an axial cutter 10. --

Paragraph on line 3 of page 12 has been amended as follows:

-- FIG. 3a shows a perspective view, and FIG. 3b a top view, of a variant of the drill bit providing another embodiment of the invention having four blades 6 and consequently four flow channels 7. In other respects, this variant is similar to the one shown in FIGs. 1a and 1b. In particular, the recessed arrangement of the shear cutters 9 on the leading edges of the blades with respect to the axial cutters 10, 11 that are in a trailing position with respect to the rows of shear cutters 9, is similar to the first discussed embodiment.--

On page 19, above line 1, insert:--We claim:--